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ABSTRACT

The development of an appropriate research policy for a university as well as for the national and international levels can be accomplished only if quantitative data and qualitative evaluations (scientific contribution, results, goal-achievement) are made available to illustrate research activities. A database is described that would enable important data about research projects to be stored, monitored and retrieved. Data types include: name of project leader, title, abstract, contact address, time, funding source, financing per year, names or full-time equivalents for researchers and administrative personnel, key words, and codes for research disciplines and application fields. The use of such data in promoting and planning research, in information exchange among researchers and to government and industry, and in evaluation of research and policy formation are discussed. Contains 14 references. (KM)

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UNIVERSITY MANAGEMENT OF RESEARCH : A DATA-BASED POLICY AND PLANNING

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for Management Research, Policy Analysis, and Planning

This paper was presented at the Twenty-Ninth Annual Forum of the Association for Institutional Research held at the Omni Inner Harbor Hotel and the Lord Baltimore Hotel, Baltimore, Maryland, April 30 - May 3, 1989. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum Papers.

Teresa Karolewski
Chair and Editor
Forum Publications Editorial
Advisory Committee

Abstract :

The development of an appropriate research policy, for each university as well as on the national and even on the international level, can only be built up if quantitative data (facts and figures) as well as qualitative evaluations (scientific contribution, results, goals-reaching) are made available to illustrate research activities.
This contribution will give an idea of a data-base which will be able to describe the inventoried research data by its various parameters.

Also important is the promotion of research information, certainly to the researchers (dynanism, reflexion effort, exchange effort) as well as to larger interested groups (government, industries, other laboratories...)

In this way, institutional researchers have a lot of work in the area of scientific research management (acces, interpretation, evaluation, diffusion, entrepreneurical science).

Introduction

Invention is not new in this twentieth century. Mankind has always changed the frontiers of knowledge. Institutionalized arrangements have evolved to motivate scientists to contribute freely to the common wealth of knowledge according to their trained abilities just as they can freely take from that common wealth what they need.
A long time ago this happened by individuals : their research activities became more and more scientific, while scientific methods were introduced. Some innovations are linked to one name ; we all know some famous names as Morse, Bell, Edison... At the end of the nineteenth century, research became more and more organised ; laboratories and research centres were founded and nowadays centres of excellence and even science parks are set up. Nevertheless the rise of the corporate research and development laboratory means that the independent inventor continues to be important, but he is no longer central. As generators of new inventions, the corporate research and development establishment is almost equally important. Production of knowledge by a team of researchers resembles in a certain way the production of manufactured goods, with their constituent parts produced by different people, possessing different expertise. In its collaborative guise it is today a routine form of productive activity in academic institutions.

Scientific activities in general have always been first and foremost the task of the universities, and this next to their always very important task of teaching. Indeed, the key principles of university research are accentuated in its goals : first of all widening the frontier of knowledge and secondly the transmission of this knowledge even in the first cycle study programmes. Both goals have their own activities which distinguish them from each other although sometimes arbitrary.

I. Research activities in a university

The framework of research activities contains a different range.
Its activities can be seen from :

a1. the level of a project :

- scientific discussions and consultations on the choice, aim and methodology of that project or activity ;
- collecting all kinds of information in preparing research activities as studying literature, programmes, observations, experiments, analyses, tests, data gathering... ;
- interpretation, analyses of this collected information and widening this knowledge by different methodological approaches ;
- formulating these results by means of reports, publications, lectures conferences and even protecting them by patents, royalities...

a2. an organising level of the project :

- arrangements of staffing, equipment and materials ;
- making proposals for extern finance and discussions with decision-makers and finance institutions.

b. the level of the research unit :

- supervising and co-ordinating staff involved in research activities (incl. doctorates)
- management and administrative work related to research activities.

c. the local (university), national or international level :

- membership of research councils, meetings, work discussions ;
- peer review.

University research may be either basic or applied and its main feature is its relative independence. All these activities may be divided in (on basis of financing) :

- contract-research which is financed and executed according to a written agreement with a non-university authority

- free research which is executed at a university, at the university's own initiative and using the university's own funds (including doctorates)
- lump-sum financed research in the form of state aid, not prior to conditions but intended to create an overall frame of reference for it.

The situation and conditions of doing research in a university together with education and even external services are expecting a kind of interdependency on scientific level and till a few years ago even on financial level. Indeed the growth in the number of students has been accompanied by a large increase in the size of university staff, with the result that the method of financing, in which there was an automatic link between teaching and research, was too general for the purposes of a sound research policy and management. As there was also no effort being made to see whether there was a comparable increase in the demand for research and its results, there was at least no incentive to develop a university research policy. Although significant developments have been taking place in the universities in recent years, research policy is still in its infancy. Nevertheless the evolution of the last years shows different reasons for the need of a coherent policy :

- there is an insufficient accountability for the money spent
- additionally there is also an insufficient evaluation of the quality of research work
- furtheron there is an increasing scientific orientation of society
- there is a more and more strongly-felt need for a staffing policy and its flexibility for research : the quality of research and teaching depends to a considerable extent on the quality and well-being of the university staff.

Research policy, both at the level of individual universities and at national level can be evolved only if facts and figures about research activities are known. Research and teaching are, however, so intertwined that the true extent of research is not clear.

Moreover it is also important to know what kind of research is being carried out and what the results are. All these elements are constituting the starting-point for planning and management of scientific research in a university.

II. Management of research

In general, management can be defined as the systematically organised and scientific way of work in which common sense and creativity are culminating to an optimal result. This is a basis on which a policy can be built up with its elements as purposes, goals, future thinkings and further on : the strategical way of work in order to reach an optimal result.

This optimal way in a university has to be realised through different tensionfields : those of the purposes and those of resource allocation, both taking into account the principle of effectivity and that of efficiency. All this is reflected in fig. 1 : the managerial situation of research.

Closely linked with planning, management and even accountability of research is the strenghtening of the internal administrative powers of the universities. Starting from this point of view, the "research flow" has two parts : an information flow and a performance flow with a certain feed-back between both at all levels (cfr. fig. 2).

The procedure of institutional research in its relationship to the management of research, backed up by this managerial and administrative powers, takes several steps : starting in the area of information (with its exchange effort) going to planning and promotion (the reflection effort) and culminating in the evaluation effort of the results of research.

III. Research information : the exchange effort

As already stated before, a systematical gathering of facts and figures is a very important and first stage in the exchange effort and makes a basis in order to come to interpretation and building up a policy.

That kind of information can be made extremely good accessable by a data bank in which several items of research data are available in a comprehensive and clearly structured form. In this way of thinking, the Flemish Universities in Belgium, thereby financially supported by the Flemish Executive, established from 1984 on

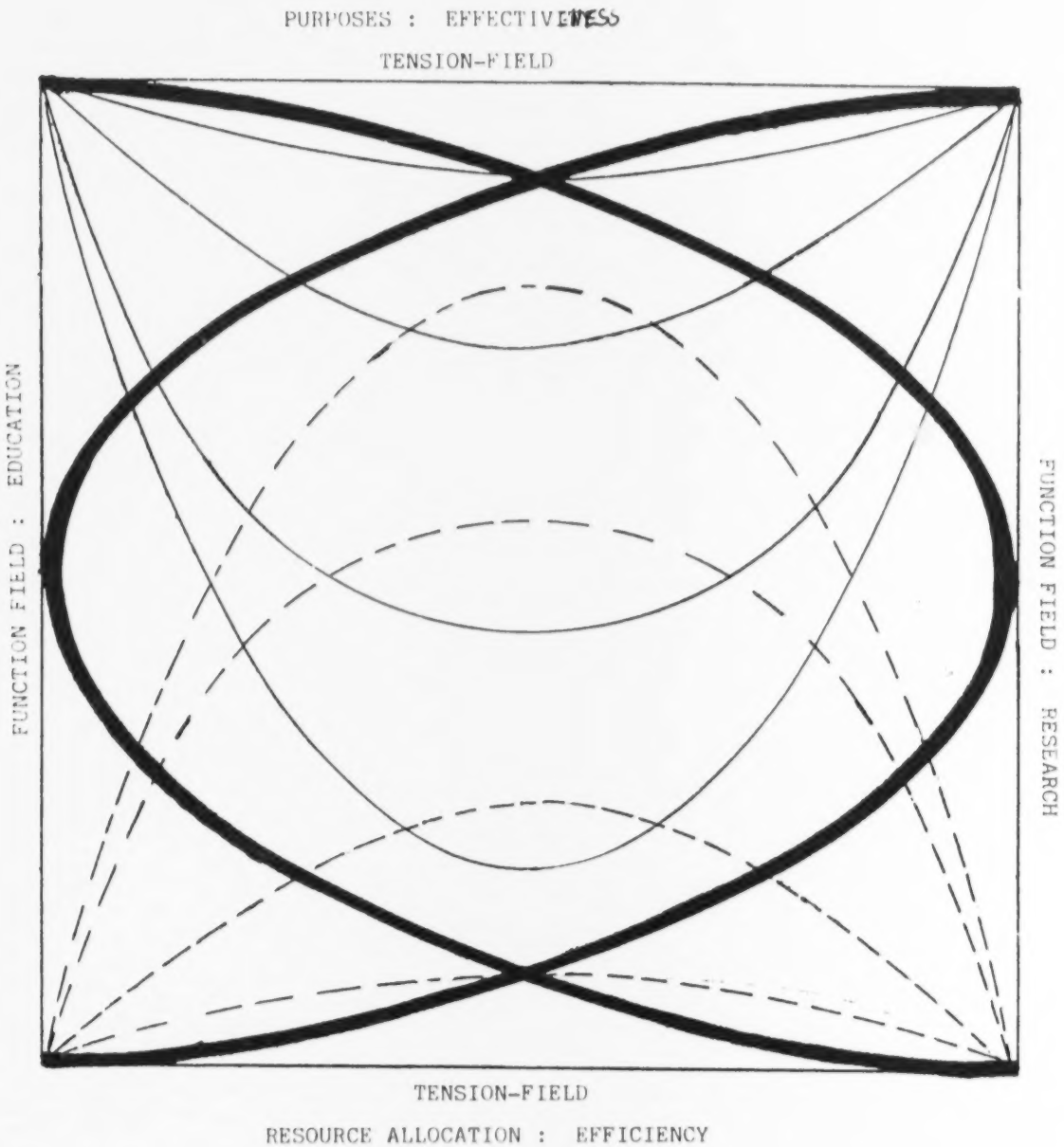

Fig. 1 : The managerial situation of research (and education) in a university.

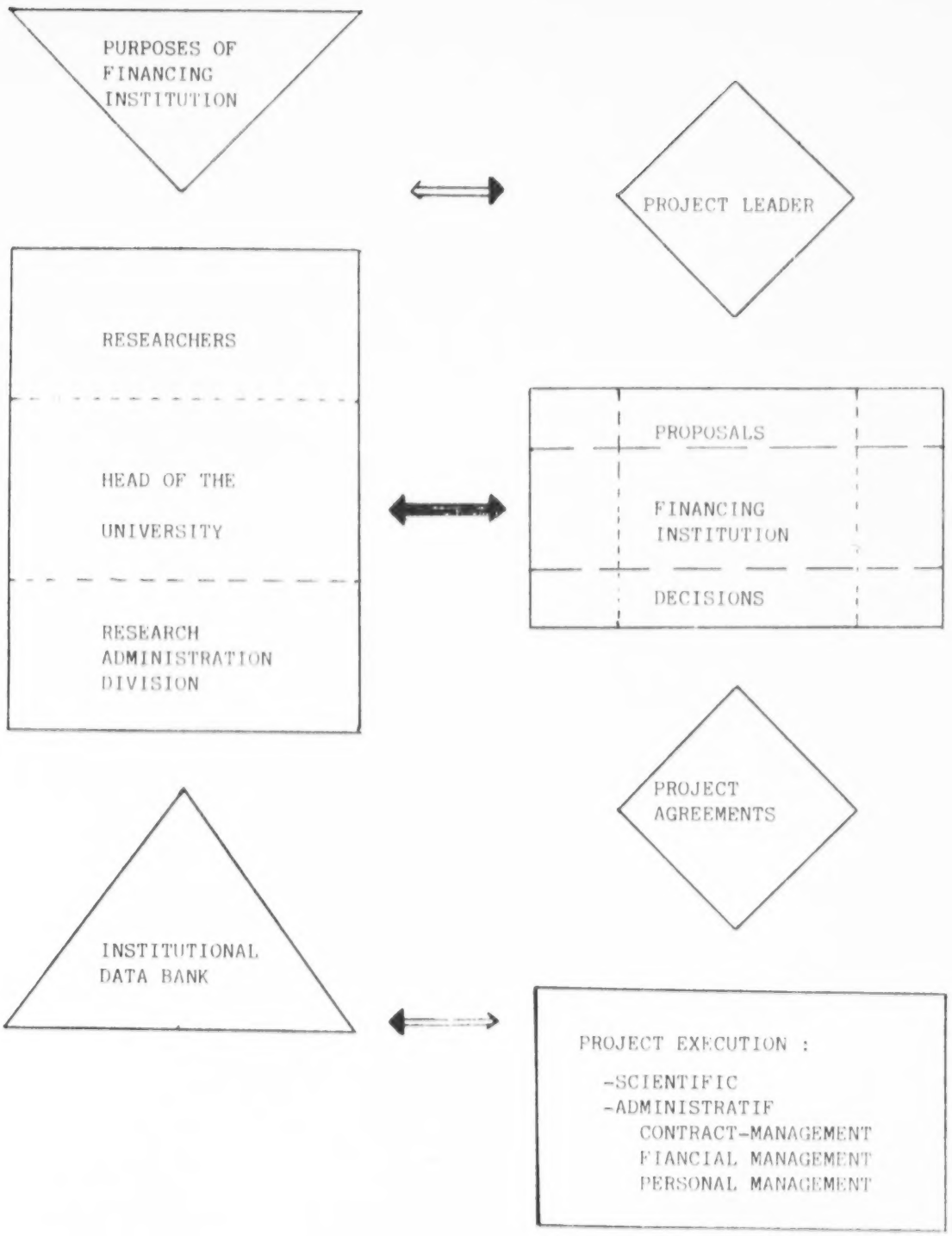

Fig. 2 : Scientific Research Flow

an IWETO-Database. Iweto is a Dutch acronyme of "Information on Scientific and Technological Research" and is a joint initiative of the Flemish Universities and university institutions, the Flemish Interuniversity Council and the Flemish Authority.

The concept of this research monitoring system was based on the use of a uniform registration model which can be used for describing different aspects of scientific research and which has to be suitable for project-management and policy-making too. It has been set up as simple as possible.

The major datasets of each project are :

1) descriptive data :
   - name of the project leader (person responsible for the research)
   - title and abstract (in Dutch and in English)
   - contact address
   - time setting
   - funding source

2) other data
   - global financing (preferably per year)
   - names or at least FTEQ (full time equivalent) of the researchers and administrative personel employed

3) inquiry keys to get entrance to the database :
   - key words (free choosen, in Dutch and/or in English)
   - classification codes : - research disciplines
     - application fields (objectives).

Another realised extension to IWETO is an inventory of the available expertises and techniques of Flemish research laboratories, i.e. of the schools for higher education out of the universities - polytechnical highschools - and some research centres. This additional IWETO-EXPERT is made especially as a tool for information and transfer of university expertise capabilities to industry and to other third parties. This inventory only contains the offer of expertises, techniques and know-how of researchers or research groups and is based on the readiness of the expert to do expertises or research for those third parties (industry, government, private

persons...). Inquiry keys are available in the form of several indexes added to this fiches : one with key words on the expertises, techniques, methods, equipment... ; another one with a list of possible users of the expertises.

Both systems are very important in the second step of the exchange effort. First of all on the scientific level, a lot of researchers are interested in simple information ; they want to know who is doing research on..., who is working in the same area (cfr. coordination). Obviously, the research teams working in their own specific subject area know each other - although most of them - and they often exchange information. But the experience already learned that they need a more systematical way of information exchange.

On the administrative level, it gives an idea of the scale of scientific work in the institution and even of the strong and weak points in its research activities (from inside and from a comparing point of view with other universities of the region or country).

As the data bank is an aggregation of research data of different universities (cfr. network) it gives other important advantages to users as there are : the policy makers, the policy planners (who need the same information as the policy makers but more in detail) and the industrial companies and researchers (who have another kind of information need). All these users are generally concerned with the future and this gathered data set them up thinking. This users' way, regularly resulting in new ideas, can be called the reflexion effort and is treated next.

IV. Promotion and planning of research : the reflexion effort

This thinkings and ideas have to grow and to be stimulated. The fact that new scientific ideas sometimes take some time to penetrate the established scientific order is rather a matter of planning. Given this entrepreneurical science, what is the scientific contribution and stimulation of one project to another, of one research unit to another ?

Firstly there are several transfers, especially the idea-transfer drawing ideas and findings upon pertinent materials which otherwise would not be utilised, and the

transfers of methods, techniques of doing research. On the other hand it stimulates interdisciplinair research support and exchange. All these enables researchers sometimes to assess for themselves the knowledge claims.

These efforts are certainly improving the quality of research, but makes the job of planning-people a lot more difficult. Beware of the academic freedom (development of their own subject, while following their own ideas), the planning of research can only be done on a long-term basis. Nevertheless it must be possible to build up a system for assessing research in each discipline or problem area.

This brings us to another promotional user of a data bank : the policy makers who are certainly concerned with the future. They try to establish goals of strategic directions to which they should move. They are interested in what is in the line of thinking about a particular subject and need also quantitative information in connection to program budget, program manpower. They also have an increasing interest in indicators as a measure of output (see later).

Considering these different points of view, what can institutional research do ? It is at least important that a lot of research work could be done, backed up by the various parameters of the research data. Some suggestions are :

* the discipline code allows to detect :
    - frequency and scale of activities in a certain scientific area, weighted by allocated staff (FTEQ) and financial means spent on it ;
    - interdisciplinary activities which are more and more important nowadays ;
    - where are the financial means coming from, for this or another area ?
    - what kind of research activities are executed in a research unit (or researcher) and its evolution in time ?
* from the finance code :
    - who is financing what kind of research ?
    - what's the share part of government, semi-government and in particular, of industry in the finance of research ?
    - where are the financial means in a research unit coming from and its evolution ?

Afterwards, an inside comparaison of these items (or compared with other universities on regional, national or international level) permits to take action on strong and weak points :

- some research area have to be pushed up, incentives and better organisational situations (personal, infrastructure) have to be created in order to stimulate research-activities ;
- some financial resources have to be claimed higher by introducing more proposals, by influencing decision-making...,
- is the financial share-part of industry underloaded or overloaded : the guarantee-limit of independency in research may be reached...

Planning and promotion of all this and other items need an entrepreneurical impact and finally requires an integrated interaction of the researchers, the planning people and the policy makers. The leading part in both is situated in the frame of institutional research.

V. Results of research : the evaluation effort

The scientists have to show that the resources, entrusted to them, have been used widely : the scope of an evaluation includes the types of research involved, the object or level to be evaluated and the time-frame within it is to be carried out.

The analyse of research data is only a preliminary step in the long way of trying to evaluate research on different levels : researcher and his unit, university-level, national and international policy (with their existing interdependency).

Each evaluation (maybe partly) can start from the top going to the bottom, by wondering if the goals of the policy are reached, if the results of the programmes are realistic. In reality, a real approach is based on the facts gathered from the bottom... Certainly, the evaluation on each level can only take place taking in account the purposes appropriate to that level. On that of researchers and research teams one needs an overview of the input (personal and financial means) and output in terms depending on the circumstances : pure results and reports, patents, bibliometric aspects... The latter is not only concerned with performances in the form of books and articles in scientific journals and periodicals of recognised scientific work, but also with mentions made of scientists' work, invitations to give

lectures and contributions to books and magazines, money and distinctions received and the influx of guest research scientists.

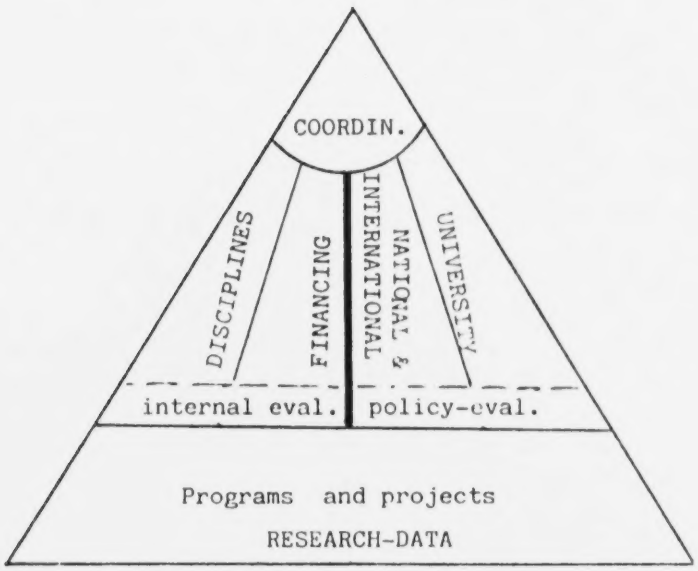

Fig. 3. : The evaluation effort of research

In general sense, terms such as "performance" and "output" run the risk of giving an oversimplified picture of the scientific process. A simple relationship between investment and effort on the one hand and production of scientific knowledge on the other, on a statistical basis requires carefull interpretation. The results of efforts cannot be determined with the same guarantees in every scientific field : every discipline has its own view of quality and productivity of a research unit.

On the other levels, evaluation may support to the detection of disappearing scientific domains as to the detection of disciplines coming up, and even the possibility exists to detect important shortcomings in existing scientific research area.

All these evaluations are rather ex-post and need to be compared with those ex-ante. Alas, there is insufficient communication between the results of ex-post evaluations and subsequent ex-ante resource allocation decisions. Ex-ante evaluations are still largely the preserve of expert-concensus while ex-post evaluations are increasingly becoming the preserve of a group of professional evaluators. Institutional research has to care about avoiding a separation between the two.

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